
Private Provision after Public Neglect: Bending Irrigation Markets in North Bihar

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ABSTRACT

Research in North-East Bihar shows public sector irrigation management to be embodied within the prevailing cultural structures of the region, involving the intrusion of local exchange behaviour into the practices of public allocation of water. With irrigation officials in strong rent-seeking positions over farmers, and without resort to a moral sense of community through which farmers might exert voice over official providers, opting out into private provision via tube-well borings and pumpsets has become the exit solution. However, the propensity to make even relatively small investments in bamboo borings is dependent upon access to pumpsets. While élite families own the pumpsets in a village, some farmers may have borings on just some of their land, and others may have no borings of their own at all. Farmers therefore have to enter into multi-layered transactions in order to secure access to timely water. Secure access to other inputs is also necessary. This study encapsulates the themes of: state versus common property resources management; the 'incentives' induced by costs of loyalty and the availability of exits to adopt private solutions; and the social embeddedness of behaviour when operating in interlocked, community level markets.

INTRODUCTION

When analysing the function of water markets in North Bihar, an appreciation of the place of culture becomes as important for understanding apparently economic, and political-economic, behaviour as the more familiar discourse concerning interlocked markets which still tends to de-personalize the actors involved by considering the subverting effect of one economic transaction upon another economic transaction. Attention to the Maithli culture of this region, especially in terms of 'codes of honour' helps us to appreciate how a society apparently in chaotic, unrestrained competition actually coheres and reproduces the conditions for such competition. The familiar elements of political economy analysis (competing classes, labour theory of value, and so on) cannot, on their own, represent the behavioural

My friend Tamiz, in the Block town of Raniganj, taught me much about the interlocking and interlinking of different markets and arenas. In his words: 'who needs assets when you have connections?' I dedicate this analysis to him.

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reality. The political economy agenda is more about outcomes (in class distributional terms involving the reproduction of poverty as well as accumulation) than about the means by which such outcomes are obtained. The focus of this article is more about the content of the behaviour which leads to such outcomes, rather than the presentation and analysis (inevitably judgemental) of the outcomes themselves. We need to understand why, under conditions of opting out of the public neglect of canal irrigation into the supposed gains of private irrigation markets, the same classes retain and extend preferential control over water and related factors of production. A key feature of this distributional process appears to be the simultaneous presence of a myth about a general price for water in the village, and absence of a market for water organized around such a single price. The absence of such a functioning market produces a distributional outcome (some small peasants are excluded from irrigation and are forced to surrender valuable plots of land). Why does the absence occur; why is there no observable rationing via price? What else determines access to water, and what is being achieved by deliberate behaviour which upholds imperfect market behaviour? The answers offered here are in terms of a maintenance of networks, and a maintenance of culture where reproducing the rules of conduct takes precedence over what might be only short-term economic advantage, since maintenance of the rules guarantees a stake in the continuing game — namely the society.

The Setting: Pachera Village

The Kosi region of North-East Bihar lies within the command of the Kosi river system, which used to flood regularly with unpredictable consequences in the monsoon flow from the Himalaya to the Ganges. In the late 1950s it was embanked, the main flow fixed, and an elaborate canal irrigation system constructed. The material for this analysis of groundwater markets is taken from the behaviour of 'peasant' farming families in Pachera village, in the northeastern corner of Bihar state, some sixteen miles south of the Nepalese Terai border. It is located within the command of the eastern 'Purnea' branch canal, the furthest east of four branch canals running north-south from the east-west main Kosi canal, with its source at the Birpur barrage on the border with Nepal, within the Kosi surface water irrigation system. Purnea, the original district town, is about thirty-five miles away; and Raniganj (the Block-level small market town) is eight miles away. Araria, the new district town (old sub-division), is fifteen miles to the east of the village and does not yet feature significantly in people's minds except for some official work. Fieldwork has been conducted at various points over the last twenty-five years; the latest sets of figures refer to 1992.

Over this period, population increase (mainly natural, but including some in-migration, mainly of landless labouring families) has led to the more

frequent division of extended, joint families into nucleated ones, with smaller holdings per household member. The total number of households in 1971 was 265, compared to 533 now, with a corresponding contrast in total population from approximately 1400 in 1971 to about 2900 now. The average family size for the village is 5.37, ranging as expected from 4.87 for labouring Scheduled Caste Mushar families to 6.29 for the Muslim households. The sex ratio is a disturbing 87 (females per 100 males): Bihar has one of the worst sex ratios of all the states of India, and this is one of the worst ratios within Bihar. Literacy is 30 per cent for men and 9 per cent for women. For men, this ranges from 45 per cent in the leading Hindu farming group of Khangars to 8 per cent among the labouring Mushars.

Where there had been many examples in 1971 of households with holdings in excess of 30 acres — indeed the richer households were in a range of 60 to 120 acres — by 1992 only one household had a holding just in excess of 30 acres. Only thirteen households had a ‘total net operated area’ (which includes leased-in and mortgaged-in land) of more than 10 acres. Using the same measure, the average holding sizes for the main groups in the village are (in acres): Khangars 6.70; Muslim 3.45; Bania 2.85; Yadav (only fourteen households) 7.81; Mushar 0.63.

This constitutes pressure to intensify land use, which relies upon successful access to agricultural inputs (in particular irrigation, ploughing, HYV seed and fertilizer packages, and transplanting and weeding labour). Access to these inputs is increasingly precarious for these smaller families, weakly positioned in markets and as recipients of unpredictable state allocations. Intensified agricultural production is preconditioned, as a result, upon successful networking with others inside and outside the village. Traditional social relations, expressed in kinship and patron–client structures and often considered a hindrance to economic progress, thus become the key to this intensification of land use. This process supports the argument that accumulation and survival have to be explained in terms of a wider set of resource profiles, which includes social and cultural resources in addition to the more familiar material and human resources (for the evolution of the ‘resources profile’ approach to understanding livelihoods, see, Lewis and McGregor, 1993; Lewis et al., 1993; McGregor, 1998; Wood, 1993, 1998). Thus households are crucially rich or poor ‘in people’ as well as in others sets of resources.

In this context, the circulation of women through marriage contracts is a major element in network maintenance. The significance of such networks to agricultural and other forms of economic survival has increased the value of ‘good’ marriages, secured through lavish dowry payments. These have increased significantly relative to household income and value of assets. The major cause of land mortgaging to moneylenders, and therefore any kind of market in land, can be attributed to the need to raise resources for dowry payments. Perversely, these have to be considered not as distractions from the productive use of resources but as contributions to it. This process also

stimulates further the intensification of land use, as increasing land productivity is seen as necessary to create the savings to regain land from mortgage arrangements.

The reliance on private networking is reinforced by the problems of dealing with the local state for vital sets of inputs (such as credit, fertilizer, pumpsets). These encounters are characterized by official corruption and public collusion, with the whole process becoming cumulative, since the networks themselves sustain the corruption. With rural credit write-offs a frequent feature of competing party electoral promises, credit indiscipline is widespread, stimulating corrupt exchanges with local state and bank officials (including for pumpsets) and undermining prospects for targeting preferential credit.

The requirement to increase agricultural productivity through the intensification of land use has therefore stimulated the development of village level technology markets, especially in irrigation and ploughing. Poorer farmers, deficit in irrigation and ploughing capacity, have no option but to enter these markets, supplied by those with surplus capacity, to preserve their land-holding status and land-based, economic viability. As suggested in general terms above, these markets do not operate in an open, competitive manner. Prices tend to be fixed by a local 'cartel' of larger farmers, who have surplus ploughing capacity (either from tractor ownership or surplus draught animals) and a concentrated ownership of pumpsets (often achieved through superior access to the state and local banks). However, a mere ability to pay this price does not ensure access to pumpset or ploughing services. Farmers have to be networked into these cartels. Poorer farmers have both a higher cost structure per unit of output and more precarious access to essential services and inputs (in availability, timeliness and price): in other words, such markets are systematically interlocked to their disadvantage.

THE CANAL OPT-OUT STORY

The imperative to use land more intensively increases the demand for irrigation, both as supplementary irrigation for the main Kharif-Aghani monsoon rice season (as an insurance against failing rains) and during the late winter (Rabi) to early summer season for wheat cultivation. The region has long been used to irrigated agriculture since the inception of the Kosi canal irrigation system, connected to the flood control embankment scheme in the 1960s. Twenty-five years ago, canals remained the main source of large scale irrigation, but even then (on my first visit to the area) there were signs of farmers opting out of the cumbersome canal system by using borings and mechanical pumpsets. Indeed there was the strong irony of the Kosi Development Agency supporting such opting out through the operations of the Land Mortgage Bank, which enabled farmers to use land as collateral to buy borings and pumpsets. Borings and pumpsets have always been partially

complementary to the canal sources in bringing awkward land under irrigation which could not be reached through the canal gravity flow system.

The canal system is operated through the Bihar Government Irrigation Department, an elaborate bureaucratic hierarchy of engineers organized to manage different levels of the Kosi physical infrastructure with a matching set of officials to collect water charges. The canal distribution system allegedly suffers from a familiar combination of bureaucratic inefficiency and technical constraints so that the farmers have lost confidence in ever securing a timely, adequate and regular supply of water. The engineers claim that water is provided on time within the technical constraints, which are caused especially by siltation in the canals. The farmers refute this claim, and allege (perhaps disingenuously) that they are being charged for water which they do not receive. In order to understand these farmers' reactions to the canal system, we need to understand that its management structure consists of two parallel hierarchies: one for assessment and the other for collecting fees (revenue). The main issue is with the engineering, assessment wing. Starting at the bottom of the 'assessment' hierarchy, there are in sequence: *bandh chaukidar* (embankment guards who prevent illegal breaking and water theft); gang supervisor; patroller; section overseer; sub-divisional officer; executive engineer (division); and finally the chief engineer for the entire Kosi irrigation programme. This structure is also responsible for ensuring delivery, since officials, from the patroller downwards, authorize final flows of water to the fields and manage the *bandhs* (raised field edges which are cut to allow water to flow).

How do the formal arrangements for assessment and delivery work out in practice? There are many ambiguities and therefore room for dispute in measurement. During a season, a plot is likely to receive more than one irrigation, but there may not be 100 per cent coverage each time. Delivery of water is often later than promised; this is awkward for the farmer in managing other inputs (crucially labour inputs), but the farmer is still charged at the normal rate and receives no compensation. A plot may not have a crop on it, but if the delivery of water is deemed to be beneficial to crops in subsequent seasons, then the farmer is charged. If a farmer has not signed up to receive water, but receives it unintentionally, the assessors can exercise discretion. If there is uncertainty whether the source of water is rainfall or irrigation, assessors can again exercise discretion. The existence both of ambiguity and discretion offers the prospect of dispute and negotiation over the basic evidence about water delivery.

These procedures and practices over assessment for water fees from the canal delivery system provide many opportunities for rent-seeking by the different levels of 'official' actor. There are many tales from farmers about the need to bribe these actors from *bandh chaukidar* upwards, not only to prevent deliberate over-charging but also to avoid discretion being exercised punitively. The predatory instincts of officials over farmers are encouraged by the setting of targets for irrigation delivery by the engineering wing of the

Irrigation Department. Thus overseers, patrollers and gang supervisors are under pressure from their seniors to submit inflated reports on the area covered by irrigation. Farmers who are reliant on the canal source are being confronted with a public sector monopoly provider, with virtually no provision for local forms of participatory management.

Several other factors reinforce the problems of efficiency of operation for the canal system and farmers' resulting unhappiness. Avoiding over-elaboration, these are: assessment and liability ambiguities arising from the complications of family division; larger farmers as patrons colluding with officials to secure preferential access as well as avoiding assessments; strong suspicions among farmers that revenue raised from water delivery is not being used for the renovation and repair of the canal system, causing increased siltation and technical inefficiencies; persistent and increasing problems for tailenders at the remoter delivery points with problems of proof about non-delivery reducing the prospects of claiming compensation for crop loss through separate Agriculture Department crop insurance schemes.

With so much ambiguity, uncertainty and room for negotiation, pressure and official rent-seeking, farmers frequently refuse to pay. Initially farmers engage in avoidance, hoping that the system 'will never reach them'. Among their peer group, there is enough evidence of inconsistency and failure of official follow-up to justify this strategy. There is much room for interpretation and the official exercise of discretion within the payment compliance procedures. Thus, not only may there be informal negotiations between farmers and the junior irrigation officials over assessment, but also much 'negotiation' over how severely the procedures regarding non-payment should be implemented. Such negotiation involves payment of bribes and other favours, which encourages more senior officials, not connected to local networks or immediately locally resident, to prey upon lower, more connected officials and the farmers. The general awareness that such negotiation is likely has prompted the elaborate hierarchical structure of supervision within the irrigation department, thus adding directly to the costs of delivering the irrigation service in the first place. A vicious circle set in many years ago: agencies do not just charge 'rents' from their clients, but different levels within an agency expect rents from those lower down in the hierarchy. The irrigation department is not unique in this respect. My fieldwork revealed similar processes in the institutional credit sector, and even adult education.

These problems with the official provision of canal sourced irrigation are not totally unfamiliar, either in India or elsewhere (Jayaraman et al., 1983; Pant, 1984). As indicated, the main response in Pachera, as elsewhere, has been to opt out into private forms of provision using borings and pumpsets (see also Brahmabhatt, 1986, and Kolavalli, 1986 for their analyses of the Mahi canal in Gujarat). The question arises why other forms of common property resource management could not be pursued in this context (Wade, 1987). There are, of course, many possible answers, notably the reluctance of

the vested interests within the rent-seeking local state (in the form of the irrigation department) to divest itself of such a lucrative asset. There are always considerable problems in managing downstream effects in surface-water, gravity flow systems if they are divided up territorially into independent, community-based management, despite some contrary evidence of inter-village co-operation (Wade, 1988). Kamalpur Section 1 of the canal system in which Pachera is located, consists of eleven 'villages', six of which are within a single Panchayat. However, the factional conflicts within the Panchayat are considerable, and divide Pachera. The likelihood of co-operation even within the Panchayat is remote, let alone between it and other villages in the section.

From our point of view, the more interesting answer would concern the potential capacity of farmers within Pachera to co-operate among themselves and jointly manage the local channels, if they were granted such a management right. There are two types of problem here: one more social, as indicated above, involving persistent factional conflict within Pachera; the second, more technical concerning topography and location of plots within the command. The evidence on factional disputes and likely problems of non-co-operation and free-riding around the management of such a large-scale, key asset (involving farmers from across caste, community and different *tola* — caste based hamlets — in the village) can be drawn from the experience of the Primary Agricultural Credit Co-operative Society (PACCS). Without embarking upon a detailed description, suffice to observe that the PACCS is currently defunct, the object of a long, increasingly bitter dispute over nominations and support between the two leading Khangar lineages in the village. Other sets of actors from neighbouring hamlets have also been recruited into these factions. The sad element of this dispute is that in personal economic terms, neither leading family needs the PACCS, but their followers do.

The more technical impediment to the prospect of co-operation is revealed in the existing disputes between farmers over the management of water flows from the local channels as well as over the differential consequences of canal irrigation on lowland and upland. The basic problem is that lowland gets waterlogged either directly from the canals (through seepage, deliberate cutting, and so on) or from the drainage from neighbouring upland. Such lowland then becomes unusable, even for Kharif-Aghani paddy. Of course, farmers with lowland and upland have to calculate the net advantage to their overall portfolio. This problem has, in the past, stimulated intense competition over access to the 'best' land, through purchase, acquisition via long-range mortgage arrangements, or induced reverse leasing. In all these processes, weaker farmers have been 'persuaded' to part with good land at least on a seasonal basis, often by denying credit and ploughing or by interference in the labour market. This, together with rich, historical lineage influence over the original lay-out of the local channels and field level water-courses, explains the non-random distribution of plots in relation to the topography of the canal system. However, this process is continuous, leaving

some strong farmers with considerable amounts of lowland, susceptible to waterlogging. It also leaves erstwhile weaker caste groups (like Yadavs) living with the consequences of their earlier lack of influence over water-course layout, but now in a stronger position to express dissatisfaction over distribution practices which waterlog their adjacent, lowland plots. The 'transaction costs' involved in such continuous competition certainly inhibit any prospect of common property management options, but they also extend into a reluctance to rely upon the officially provided canal sources of irrigation.

It is in the context of these problems of access, exit, payment and the conflicts generated among the farmers through dealing with the irrigation bureaucracy that alternative irrigation arrangements have become more attractive not just as a complement to the canal sources but also as a substitute. When the canal source of irrigation was at its peak, using net figures, some 250 acres in Pachera were irrigated with little alternative irrigation. Now approximately 150 acres receive some irrigation from the canal sources, and a further 500 acres are irrigated from groundwater sources. Thus, with irrigation officials in strong rent-seeking positions over farmers, and without resort to a moral sense of community through which farmers might otherwise have exerted collective voice over the official providers, opting-out into private provision via tube-well borings and pumpsets has become the exit solution.

THE GROUNDWATER EXIT OPTION

The problem with the groundwater exit option is that only a fraction of the farming families have the option to be self-providers with their own pumpsets. Most farmers therefore have to enter a water market, despite its imperfections. Water selling in one form or another is prevalent. Two sets of questions then arise: in what ways do these alternative markets differ from the quasi-bureaucratic service, or are these groundwater markets also 'quasi'; and in what ways, if any, are the services to poorer farmers improved to the point where their own farms become more viable and less vulnerable to the predations of the richer families in the village? From my Bangladesh experience, I am also tempted to ask a third question: do the conditions exist to support a strategy of water-selling by the landless in the area? (Wood and Palmer-Jones, 1991).

High Water Tables and Bamboo Borings

The private groundwater alternative to officially provided canal sources of irrigation is supported by the hydrological conditions in the region, with exceptionally high water tables. Such conditions reduce the costs of groundwater irrigation in various ways. There is the option for a cheap

boring technology, using locally-available bamboo materials (bamboo cut into long strips and tied around a series of iron rings to make a thirty-foot tube): the combination of soil composition and high water tables enable these 'indigenous' tubes to be sunk at low cost. Thus access to the boring technology is widely available. While this is not the principal constraint, many farmers will nevertheless rely upon borings of neighbours. The problem for farmers is that their plots are likely to be scattered over the different areas of the village as part of kin-ecology and historical, risk aversion, fragmentation strategies on family division. The question then arises of how many borings they can afford on different plots. Even richer farmers may not have all the borings they need, but it is certainly a more significant problem for the smaller farmers, with less capital. Furthermore, the incentive to invest in borings is partially determined by the security of access to pumpset services.

We therefore need to distinguish between boring and pumpset transactions. In the early 1990s, there were about twenty-five diesel-driven pumpsets in the village, but considerably more than 100 borings. Ownership of pumpsets is confined to leading farmer families, but this ownership is not secured just through having an ability to pay: other connections to the state (in the form of designated banks and officials) are required. The majority of borings are held by families who do not own pumpsets. At the same time, there are many households who do not own borings but nevertheless irrigate their land with them, by accessing the borings of neighbouring plots. Further variations include: some households will own several borings (with or without owning a pumpset); some households now share borings with other households as a result of family division. Under these conditions, the groundwater markets can become very complex.

Market Myths in the Village

The information received during fieldwork on these markets varied over time, and reveals much about the social and cultural embeddedness of water transactions. At first, we were told that borings attracted no rental, and that pumpsets were rented out at a standard charge of Rs 10 per hour regardless of the relations between the parties to the transaction. This fixed rate was explained in several ways. It was acknowledged, even by richer landholders and pumpset owners, that a cartel of richer pumpset owners had set this price to avoid undercutting each other. More subtly, this was explained as a way of reducing transaction costs. The publicly understood fixed rate, it was argued, avoided pumpset owners competing with each other, having to arrange special, one-off deals, and creating friction amongst themselves. However, it is important to recognize another dimension to this stance. The whole idea of selling surplus capacity, of water-selling, was perceived as immoral, to be admitted only *in extremis*. Water-sellers were curiously shy

about admitting commercial attitudes to water and irrigation, while being happy to describe other commercial transactions, and even willing to describe their involvement in corrupt practices with the local state. There seemed to be an idea that water is a natural, common-pool resource, where charging was somehow indecent. Such attitudes may, of course, have affected attitudes towards, and stimulated the criticism of, paying for canal sources of irrigation. At the same time, this stance could be seen as disingenuous, a veil for rapacious behaviour, a reluctance to admit that commercialism is consistent with honour.

Later in the fieldwork it was revealed that pumpset rates will vary especially between close kin and non-kin, and that there can even be a charge component for boring use of Rs 1 per hour, so they are not regarded as a free good for all. When borings are shared between families who have divided since the boring was sunk, there is obviously no charge. Pumpsets, however, are more complicated. If pumpsets are genuinely shared between divided families in purchase and maintenance, then each separately cultivating household may use the pumpset and meet the relevant operational costs. It is likely, though, that such families will be cultivating divided, but adjacent plots served by a common boring so that they are sharing the operation of the pumpsets.

Other conditions may exist, in which the pumpset is clearly the property of one of the separated households, in which case the other households in the ex-extended family may use it at cost (that is, with no public intent of commercial advantage from using the pumpset as a direct source of income, although this still allows for the possibility of using the leverage of pumpset owning to secure access to others' land by denying access). Pumpset owners, whether individual or collective, are generally landholders with their own cultivating interests. They are concerned, then, to meet their own irrigation requirements before 'being persuaded' to rent out surplus capacity to others. Thus, their main preoccupation is with the productivity of their own land for commercial and/or consumption purposes.

This would be consistent with a self-image of the autonomous peasant family, preoccupied with familism, minding one's own business. Renting out surplus capacity is seen variously as: a favour to less capitalized families (a sharing of good fortune rather than an opportunity to exploit, a bonus income not sought after); or an opportunity for leverage over another family (in order to secure access to more land — see below — or labour services at peak periods of labour demand). Furthermore, if these pumpsets have been purchased at heavily subsidized rates (either a deliberate subsidy policy or unintentionally through default on credit), then owners have less incentive to seek a return on investment by renting out beyond their own, immediate cultivation needs. Under such conditions, there is likely to be a serious under-utilization of capacity, though the engine may last longer as a result. (Such under-utilization has been well observed in Bangladesh; see for example Wood and Palmer-Jones, 1991.)

Tail-ender Problems

With this attitude towards pumpset use by owners, there is a potential 'tail-ender' situation even for those farmers with plots well served by their own borings, but insufficiently networked to obtain access to the services of one of the private pumpsets in the village. Further 'tail-ender' problems can exist when a pumpset-sharing family is weaker than the families of other brothers and cousins, or if their divided portion of land is less favourably located to a boring. The worst situation (apart from having no boring-irrigated land at all) is when a family's land is physically at an unreliable distance from the boring source. Given the kin-based logic to the layout of fragmented plots, such remoteness implies a genealogically weak network connection to the boring holder. Furthermore, farmers with such remote plots need to persuade other farmers, with intervening plots between the boring location and the remote plot, to join in collective irrigation from the source at the same time, as a precondition for effective access. The problem for such farmers is that water-channels on a long 'by-pass' route around non-irrigation seeking intervening plots can easily seep or be deliberately diverted into such plots, thus allowing holders of intervening plots to free-ride. Elevation might be a problem in any case, requiring co-operation from intervening plot holders to build up their *bandhs* to enable the gravity flow.

Pumpset holders tend to raise their rates under such conditions, predicting both lower pumping efficiency and a higher probability that customers will not be able to negotiate successfully with the other intervening plot holders. These negative management conditions increase the uncertainty that the pump will actually be operated when attached to the boring. The opportunity cost to the pumpset holder of 'losing' the pumpset for a day or two to such a customer, in favour of either own use or for use by other holders of more reliable plots, needs to be compensated.

Patron Suppliers and Consumer Clients

We can see from these situations that a considerable amount of negotiation is required in order to secure irrigation through a pumpset/boring package if it is not entirely individually owned. For a family without a boring, but land within the command of someone else's boring, two separate arrangements may have to be made: with the owner(s) of the pumpset and with the owner(s) of the boring, if different. The ability to make these arrangements is clearly very important to farmers, especially smaller ones with a greater incentive to use their land intensively. Yet it is smaller farmers who are least likely to own pumpsets or to have multiple borings to service their various plots, and who are at the same time less well networked to richer pumpset/boring owners. These are not the conditions to support an open market for groundwater irrigation. Small farmers are, almost by definition, clients of

richer farmer patrons. Their 'client' status stretches across the familiar relationships of access to land, employment and credit. More specifically though, such client families operate strictly within their own caste and community, and in the case of the numerically dominant landholding caste of Khangars within particular extended lineages and factions.

Thus there are long term arrangements between individual patron suppliers and consumer clients, in which the irrigation transaction is part of a set of multi-transactional ties. It is here that the idea of a prevailing price breaks down, with favoured clients clearly having more timely access at reduced rates. However, these are not public prices (although the variations are well known). The myth of the universal price acts as a defence for pumpset owners who do not wish to attract endless negotiations with other, less-favoured potential clients arguing a special case for concessionary rates. So the public 'cartel' price exists for those families outside the intimate circle of moral proximity to the class of patron providers. However, the notional existence of such a general price does not translate into economic entitlement for those prepared to pay the price. Such families can still be, and often are, denied the use of a pumpset. The function of a 'general price' is to reduce the transaction costs, if a pumpset owner decides to permit a rental to a non-intimate.

Thus, at one level of understanding, there appears to be a simple equation of: numerous borings, held in various patterns of ownership sometimes overlapping with pumpset ownership; and a small number of pumpsets (in individual or shared household ownership) which are peripatetic, in the sense of being mobile (transported by bullock cart) and attached to different borings. These pumpset/boring combinations irrigate the land of: pumpset owners first; close non-competitive kin second; favoured clients third; and then a non-random group of non-intimate others where access is not determined by price elasticity but other 'leverage' or power considerations, socially and culturally embedded, and variably specific to different families.

Pumpset 'Territories'

Within this framework of behaviour, we can see the pumpsets of respective owners operating primarily within a fixed 'territory' defined by kin, caste and dependent client families of other *tola*. Encroaching upon the 'territory' of another pumpset owner does not happen by accident. A pumpset owner might be attracted by the prospect of poaching a client from a competitor by encroaching upon another's territory — a deliberate act of provocation as part of a wider conflict. Also, a pumpset owner could not merely extend his territory in response to elasticity of demand. Such a form of competition is constrained purposively by the cartel 'agreement' on a fixed higher rate of Rs 10 per hour, so that a desperate, weakly-networked, small farmer cannot secure access by offering a higher price. He would have to offer something

else, that was 'hidden' from view. This is where the interlocking of such relationships occurs.

Secure Access and Timeliness

Irrigation is crucially about the security and timeliness of supply. Irrigated crops require considerable investment from plot preparation onwards through the season with inputs and other operations, especially weeding. It is disastrous to start the season without a guaranteed supply of water to complete the season. This accounts for the frustration with canal sources of irrigation where continued supply is unreliable, with little prospect of seeking redress or satisfaction from the irrigation officials, and has led, as we have seen, to the preference to opt for other sources of supply via groundwater. This preference was based upon the prospect of such local suppliers being more reliable, if not through principles of market efficiency, then on account of the moral proximity between provider and user. But this exit option (from canal to groundwater sources) remains problematic for many without pumpsets.

As indicated above, there are concentric circles of moral proximity. The greater the moral distance from the provider, the more instrumental the transaction. Thus, a weakly-networked farmer and user in the boring/pumpset system has a precarious hold on the guarantee of necessary water supply, and therefore must work hard on his network position. The price mechanism alone is inadequate to secure this guarantee. We therefore have to be alert to other dimensions of these water transactions between supplier and consumer, such as: land exchanges (preferential reverse tenancies and mortgage/debt deals); support in panchayat meetings; maintenance of rich farmer policy on wage rates; other labour services (perhaps involving women and children) such as ploughing; and unspecified favours. We also have to be alert to the ability of such poorer classes of farmer to secure access to accompanying inputs (seed, fertilizer, etc.) and the credit to obtain them.

Irrigation and Tenancy

The interaction between irrigation and tenancy is significant, and is also affected by access to other inputs. The traditional structure of hierarchical tenancy is altering rapidly under these conditions. Land which cannot be irrigated and/or for which there is no use for modern variable inputs, could still be leased out under traditional sharecropping arrangements if the 'distance to farmer's house' variable was strong and the 'farmer's portfolio' variable weak. Good land which is isolated from other plots or from the homestead also represents a problem and may be leased out or even sold, rather than attempt to manage and protect a crop in which there has been a

high investment. Crop theft is on the increase, with farmers now guarding certain, high investment, crops at night. Clearly, they are reluctant to guard crops and prevent cheating on irrigation too far from their homestead areas and any prospect of emergency assistance.

With mechanized irrigation and the use of modern variable inputs, we must expect small farmer tenants to lose the opportunity to cultivate the best quality land (in the sense of soil type, elevation and location) under traditional sharecropping relations. Generally we can argue that irrigated land is more likely to be kept in a family's direct cultivation and that the wider availability of irrigation through borings and pumpsets therefore has the function of reducing the amount of land available for sharecropping. Again much depends upon a small farmer's ability to rent-in irrigation services at appropriate times. It is mechanized irrigation which most provokes new forms of reverse and seasonal tenancy, though mechanized ploughing can create similar opportunities.

Small farmers who are unable to manage the portfolio of required investment for irrigated wheat or rice on suitable land (irrigation, ploughing, extra and timely labour, variable inputs supported by credit), are increasingly obliged to offer it on a seasonal lease to a farmer who can manage such a package. (If the farmer is unable to realize the irrigation potential on a plot of land, it is unlikely that the plot would be leased out in a traditional sharecropping relationship since a poor farmer-cum-sharecropper would have the same problem.) Such 'reverse' tenancies are increasingly common. The land returns to the farmer for the low-investment seasons (typically rainfed Kharif-Aghani which might only require supplementary irrigation) where inputs and risks are lower. Within their 'territory', pumpset owners can influence the ability of a small farmer to manage the necessary portfolio by withholding irrigation, even at the prevailing price, and other 'services' such as ploughing (if the small farmer is bullock-deficit) and credit. In this way, pumpset owners can acquire additional land for the higher yielding seasons, thus significantly increasing productivity on their own cultivation. The small farmer, who has leased out, can only expect a reduced share of the crop (25 per cent) after costs.

However, richer farmer/pumpset owners will not always pursue such reverse tenancy options under these 'favourable' conditions. Their strategy, and its precise content, will depend upon the moral proximity of the small farmer client. Thus some may be 'helped out' by providing concessionary irrigation (and ploughing); others may be helped out by taking the land in seasonal tenancy, but offering a better share of the crop. Thus pumpset owners have options whether to be predatory or not. Similar calculations apply to credit. It could be withheld to secure land under a seasonal, reverse tenancy since the small farmer would be denied the capital to cultivate; or it could be offered attached to a mortgage arrangement (now the most common form of moneylending in the village) so that a small farmer would have to 'surrender' some land.

MANAGING THE PORTFOLIO: LABOUR, PLOUGHING AND INPUTS

The problem of managing the accompanying portfolio for irrigated agriculture clearly has other dimensions for farmers without pumpsets. This is not the place to explore these problems in any depth, but they are relevant to the analysis. Within the village, and therefore within the networks of the village, access to non-family labour and ploughing services are crucial in addition to irrigation itself and credit (assuming availability of appropriate land). Outside the village, access to modern variable inputs adds a further dimension.

The recruitment of non-family labour at peak periods of labour demand is becoming more difficult for all farmers as they compete with out-migration of North Bihari labour to the Punjab at higher net wage incomes. But small farmers are especially squeezed in this competition. In a similar way to irrigation, there is strong peer pressure from the major employers not to raise wage rates (even in comparison to higher wage rates in surrounding villages). Richer farmers, while reporting problems of recruiting and controlling labour, are able to use debt and landlord relations to secure labour at the agreed wage rates, particularly employing more women of indebted families. Small farmers do not have the same kind of leverage, and would lose other networking credentials if they were to offer higher wages (assuming they could afford them). Thus smaller farmers have more precarious and uncertain access to labour at peak periods, and therefore tend to employ labour at less favourable times (especially for plot preparation, transplanting of rice, weeding and harvesting) which can impair the yield coefficients of irrigation.

Ploughing services are also critical. With a dynamic socio-economy (family divisions and changing ratios of landholding per household), farming households are frequently unbalanced in the relation between land needing to be ploughed and available draught power. Depending upon their position in a livestock/landholding cycle, smaller families may have a bullock/buffalo surplus or deficit. The general result of a much longer story is that many small farmers have a ploughing livestock deficit and have to rent in ploughing services. This also applies to some larger farmers as well, though their imbalance may be more temporary. The distribution of pumpsets is matched by an even greater concentration of tractors (four in the village, with occasional rented-in capacity from outside the village, usually between affinal kin). Again, access to ploughing services relies heavily upon successful networking. The market is tainted and socially embedded. Smaller farmers are generally on the tail-end of the queue for tractor ploughing services, if they can access them at all. They have to rely more heavily either upon 'horizontal' renting-in of bullock power or reciprocal exchange of bullocks where two are each in deficit. All of these options represent greater constraints, less autonomy of decision-making and timeliness, and add to the precariousness of managing the portfolio.

As if these were not problems enough, access to modern variable inputs is more precarious (and potentially more costly per unit and time-consuming to acquire) for smaller farmers. With the Primary Agricultural Credit Co-operative Society (PACCS) in the village failing through factional conflict, obtaining seed and fertilizer at concessionary rates is even more hazardous as it depends upon institutionalized credit via the locally designated Nationalized Commercial Bank (NCB) or District Co-operative Bank linked to distribution by licensed input dealers. Variable inputs at non-concessionary rates also entail informal credit from within the village or nearby; in order to offset the high risk of defaulters and to cover transaction costs, money-lenders set high floor rates of interest, especially on small loans. These interest rates also reflect localized credit monopolies (see also Lipton, 1989: p. 287). In both 'arenas', it is important to be regarded as a favoured client. Brokers are usually required in the former arena, and patrons in the latter.

Constraining Market: The Imperfect Private Option

Given these three additional dimensions of the portfolio (access to labour, ploughing and variable inputs) it is clear that mechanized, groundwater irrigation markets cannot be understood in isolation from other complementary transactions, and that these transactions display similar sets of characteristics in respect of networking requirements and the pursuit of multiple objectives by the parties concerned. Any concept of 'demand' for water has to be tempered by these transactional problems for farmers in other arenas, especially smaller farmers with non-favoured client status. Obviously these problems existed for farmers when they were solely reliant upon canal sources of irrigation, but in the period of incremental shift from surface to groundwater sources of irrigation (over the last twenty-five years), the growth in population and family division has increased the reliance of most landholding households upon a more intensive cultivation of their land. Mechanized, groundwater sources of irrigation, in an area of high water tables, offered the prospect of greater, more secure access to water for such intensive farming, and for the principles of the market to ensure higher, overall land productivity.

This has only happened to some extent. The technological opportunities have transferred the irrigation dependency of smaller farmers from the state-run surface water system to a class of rich patron, pumpset owners who were already patrons in other arenas. The imperfect, socially embedded groundwater markets have functioned to reinforce rather than relax that dependence, constraining the opportunity for many small farmers with non-favoured client status to increase their cropping intensity. As a productivity outcome, either land is increasingly coming into the hands of adequately capitalized farmers (even if only partially, on a seasonal basis for the high investment crops) or its potential with the new technology is under-realized

as it remains with farmers who cannot manage the various dimensions of the high productivity portfolio. Once again, in the analysis of agrarian change, technical opportunities are socially constrained to serve other purposes.

Acquiring the Asset

The story of private provision after public neglect does not quite end here. It has been clear in much of the preceding analysis that pumpset acquisition is crucial to a successful exit option from the state-run canal service. There are only twenty-five pumpsets in a village of more than 250 cultivating households. Pumpsets at subsidized rates are in short supply and considerable networking and imagination is required to obtain an allocation via the local state. There are quotas 'targeted' upon poor families. Nevertheless, several of the pumpsets in the village owned by richer families have been acquired through these quotas. A 'broker' manages the deal. He approaches a target poor family and asks whether it would like to receive, say, Rs 1000, relatively risk-free. The family's only involvement is putting a thumbprint or signature to a loan document for a much larger amount, which is the subsidized pumpset price. Technically the family has purchased a pumpset, but the pumpset is sold by the broker to a rich farmer who has indicated a desire to buy at a price higher than the subsidized rate but lower than any open market rate (if available at all). The 'target' family never sees the pumpset, but receives a pay-off along with the broker, the licensed pumpset dealer, the bank official and other departmental officials whose counter-signatures have been necessary at various stages of authorization. It is worth noting that all cases of official credit in the village identified and analysed during fieldwork involved similar corrupt practices.

CONCLUSION: MARKET AND STATE — SAME MORALITY, SAME OUTCOMES

As I have argued elsewhere (Wood, 1994: Ch. 21), the great dilemma for post-independence India has been the attempt to use the state to control the inegalitarian excesses of markets, while being unable to separate the operation of the state from these markets. It has been impossible to repress the ability of stronger classes to turn the state into a market for their own accumulation. The evidence from Pachera reveals a defaulting state in both surface water delivery and the regulation of groundwater opportunities, unable to control markets and itself thereby marketized. The space has been created within which both public and private predators flourish — public officials and private brokers colluding to defraud consenting clients who rely upon a combination of monitoring incompetence, imperfect auditing, the lottery of spasmodic state harassment and populist policy concessions (credit

write-offs) to avoid being any more than the nominal victims of such fraud. In this game, the state purports to redistribute resources, assets and opportunities but in practice produces redistributive outcomes which might have occurred in the market-place, but now with officials joining in the profit taking as a privileged class of commercial entrepreneurs using monopoly positions to secure rents and avoid risks.

Thus to be dominant in the groundwater markets in the village and to gain further leverage thereby over other assets and services from client households, richer farming households need to participate in this wider interface with regional markets and the local state. The problem even for richer farmers, well-networked across the region, is to identify what ground rules of morality and trust apply to achieve successful transactions. If we consider the institutional range of resource allocation behaviour to be conceptually framed by the 'moral community' at one end and the ideal, perfect market at the other, then most real allocative behaviour occurs at some point between these two extremes, in which trust is therefore a problem. In the complete moral community, perfect knowledge of transacting parties equals perfect trust, at least in the sense of predictability. In the ideal, perfect market, trust is not required, just a belief in a stable currency and the value of competition to overcome rent-seeking and to maintain acceptable norms about rates of profit. Where neither set of conditions prevails, and this is certainly the case in strong rent-seeking societies, then trust and transactional morality are problematic to the actors.

This issue of trust has been addressed in the policy context of establishing free markets as part of the expansion of modern, 'efficient' activity (Platteau, 1991). If one accepts the proposition that the required degree of trust in transactions can only be guaranteed within a narrow framework of highly personalized relationships, then it is difficult to see how fraud and deceit can ever be overcome in more open society conditions in which the state (let alone other economic agents) has come to visit the local community. Platteau points out that Granovetter's (1985) extension of the principle of personalized trust to the conduct of modern market economies can only control opportunism by subverting the other (neo-classical) condition of market activity, namely the freely acting agent. At the same time, Platteau acknowledges that Granovetter has a point in rejecting this neo-classical principle of economic behaviour, since the activity of economic agents is embedded within 'concrete, ongoing systems of social relations' which have been the constant theme of the foregoing analysis. Where the analysis here would differ from both Platteau and Granovetter is in their implicit evolutionist assumption that the problem of understanding markets in such societies arises from actors having to move from the personalized morality of the 'village' to a generalized, universal morality of the wider, open 'market', whether in the private or public sector (see also Lewis, Wood and Gregory, 1996, esp. 36–40, for a critique of this assumption). The position advanced in this article is that actors are making calculations within a framework of

concentric circles of moral proximities and perceived strategic advantage, in which the irreducible moral unit is the nucleated household (although note is taken of gender discourses which are critical of this assumption in other contexts). In this sense, the issues of trust and morality are not qualitatively different in the understanding of transactional behaviour whether in local or wider markets.

In the context of this region of North Bihar, the argument here is that the relationships in these different arenas as revealed in the analysis of village groundwater markets, interpenetrated by external links to private and public sector actors, are governed by a consistent cultural code. In effect, there has always been a regional code of behavioural ethics rather than a moral boundary set at the edge of the 'village'. This code permits calculative behaviour, which can be rapacious and predatory, or protective and reciprocal according to perceived strategic advantage. Excesses of competitive behaviour are modified by actors' knowledge that they are participating in multi-period, multi-transactional games. The maintenance of a moral code within such multiple objectives, which can be pursued over long periods, is essential. The elements of this code, in this Maithli region of North Bihar, can be described as: dishonourable behaviour in one transaction attracts a reputation and impedes successful transactions elsewhere at another time; honourable behaviour can be compatible with deliberate exploitation of another's vulnerability, even cheating, as long as one operates within codes of formal politeness (protected in our case by the presentational use of cartel pricing); consistent with this is a strong sense of front and back in the presentation of face (in which the front is determined by these codes of honour, while the private back can be hidden from view and managed with greater flexibility).

Competition without such a code would not be sustainable. The quasi markets described above do, after all, require moments of collusion and collaboration. This is how we return to the structuration (Giddens, 1984) and actor-oriented (Long and Long, 1992) nature of this analysis, in which these processes of institutional adaptation reflect a cultural bending of markets first to secure livelihoods under new conditions, and secondly to maintain class outcomes. This is what lies behind the rhetoric of liberalizing the Indian economy: markets are no less socially and culturally embedded than the state.

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